SEMESTER EXAMINATION, DECEMBER -2022

Course Name:-B.Tech(CS) **Semester:- 3**

Paper Name:-Discrete Mathematics **Paper Code:- TCS 304**

Time - 2 Hrs + 20 minutes per hour extra time for V.I. & examinees with writer. **Max Marks-70**

समय– 2 घण्टे + 20 मिनट प्रति घंटे अतिरिक्त–दृष्टिबाधित एवं सह लेखक परीक्षार्थियों के लिए। अधिकतम अंक–70

Instructions:

- The question paper consists of three sections namely A, B, C. All sections are compulsory.
- Section A- Each question carries **04** marks. All questions are compulsory.
- Section B- Answer any **2 out of 4** given questions in maximum hundred **(150) words**. Each question carries **10 marks**.
- Section C- Answer any **2 out of 3** given questions in maximum five hundred **(250) words**. Each question carries **15 marks**.

निर्देश:

- प्रश्न पत्र में तीन खण्ड अ, ब, व स हैं। सभी खण्ड अनिवार्य हैं।
- खण्ड–अ में प्रत्येक प्रश्न **चार** अंक का है। सभी प्रश्न अनिवार्य हैं।
- खण्ड–ब में **चार** प्रश्नों में से किन्हीं **दो** प्रश्नों के उत्तर अधिकतम **डेढ़ सौ** (150) शब्दों में दें। प्रत्येक प्रश्न 10 अंक का है।
- खण्ड–स में **तीन** प्रश्नों में से किन्हीं **दो** प्रश्नों के उत्तर अधिकतम **ढाई सौ** (250) शब्दों में दें। प्रत्येक प्रश्न 15 अंक का है।

Section – A (खण्ड–अ)

Objective Questions(वस्तुनिष्ठ प्रश्न)

1. Answer all the following questions. **5×4=20**
निम्नलिखित सभी प्रश्न अनिवार्य हैं।

i) The cardinality of the Power set of the set {1, 5, 6} is_____

a) 5
b) 6
c) 8
d) 10

$2^3 = 8$.

ii) Which of the following function is also referred to as an injective function?

a) Many to one
b) onto
c) One to one
d) None

iii) Which of the following is/are the type(s) of relation?

a) Reflexive
b) irreflexive
c) symmetric
d) all of above

iv) A Poset in which every pair of elements has both a least upper bound and a greatest lower bound is termed as _____

a) Sublattice
b) lattice
c) poset
d) path

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v) A cyclic group is always _____

a) Abelian

b) Monoid

c) semigroup

d) subgroup

Section – B (खण्ड–ब)
Short Answer Questions (लघुउत्तरीय प्रश्न)

2. Answer any two of the following questions in maximum 150 words. **10×2=20**
निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर अधिकतम 150 शब्दों में दें।

i) Define coset. Show that the set of all positive rational numbers form an abelian group under the composition defined by a*b= (ab) /2

ii) Define recurrence relation and solve the following recurrence relation

$$a_{r+4} + 2a_{r+3} + 3a_{r+2} + 2a_{r+1} + a_r = 0$$

iii) Define Complete graph, Bipartite graph, null graph, Euler graph and Hamiltonian ckt.

iv) Briefly explain tautology and contradiction. Determine whether the following statement is valid or not premise $p \rightarrow \neg q$, $r \rightarrow q$, r conclusion $\neg p$

Section – C (खण्ड–स)
Descriptive Questions (विवरणात्मक प्रश्न)

3. Answer any two of the following question in maximum 250 words. **2×15=30**
निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर अधिकतम 250 शब्दों में दें।

i) Show that if (A, ≤) and (B, ≤) are posets, then (A × B, ≤) is a poset with partial order ≤ defined by (a, b)≤ (a', b') if a ≤a' in A and b ≤b' in B .

ii) Define Complemented and Distributive lattice. Show that the set (P(S), ⊆) for S= {a, b, c) is lattice.

iii) Define equivalence relation. If R be a relation in the set of integer defined by R = {(x, y): (x-y) is divisible by 6 } then prove that R is equivalence relation.

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$q \vee (b \wedge c) = (q \wedge b) \vee c$

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